UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HICHEM M'SAAD and ANCHUAN WANG

Appeal 2007-1851
Application 10/020,461
Technology Center 1700

Decided: June 15, 2007

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and
CHARLES F. WARREN, *Administrative Patent Judges*.

KIMLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-4, 6-13, 15, 16, and 21-42. Claim 1 is illustrative:

1. A method of forming an optical waveguide, the method comprising:

flowing a silicon source gas into a process chamber;

flowing an oxygen source gas into the process chamber;

forming a high-density plasma in the process chamber from the silicon source gas and the oxygen source gas;

forming a plurality of separated silicate glass optical cores over an undercladding layer disposed within the process chamber with the high-density plasma, the separated silicate glass optical cores defining a sequence of gaps; and

depositing an uppercladding layer over the plurality of separated silicate glass optical cores,

wherein each of the silicate glass optical cores is formed with a refractive index greater than a refractive index of the undercladding layer such that each of the optical cores has a contrast relative to the undercladding layer greater than 2%.

The Examiner relies upon the following references as evidence of obviousness:

Dragone	US 5,136,671	Aug. 4, 1992
Kyoto	US 5,221,309	Jun. 22, 1993
Bazylenko	US 6,154,582	Nov. 28, 2000
Johnson	US 6,614,977 B2	Sep. 2, 2003

Applicants' admission located at the bottom of page 3 of the paper of Aug. 23, 2004

Appellants' claimed invention is directed to a method of forming an optical waveguide comprising a plurality of separated silicate glass optical cores over an undercladding layer. The process involves forming a high-density plasma from silicon and oxygen source gases in a process chamber, and using the plasma to form the optical cores. The refractive index of the silicate glass optical cores has a contrast relative to the refractive index of the undercladding layer of greater than 2%.

Appealed claims 1, 2, 15, 16, and 22-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bazylenko and Kyoto in view of Dragone and the admitted prior art. Claims 1-4, 6-13, 21-26, and 29-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Johnson and Kyoto in view of Dragone and the admitted prior art.

Appellants have not presented separate arguments for claims 29-42. Accordingly, the Examiner has properly held that claims 29-42 stand or fall together with the remaining claims on appeal.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the Examiner's rejections for essentially those reasons expressed in the Answer, and we add the following primarily for emphasis.

We agree with the Examiner that the two primary references, Bazylenko and Johnson, disclose, like Appellants, a method of forming a silicate glass optical core over an undercladding using high-density plasma deposition (HDP) in the formation of an optical waveguide. Bazylenko does not explicitly disclose forming a plurality of silicate glass optical cores but, from our perspective, the reference clearly would have suggested as much to one of ordinary skill in the art. Bazylenko does expressly disclose that the inventive method is used in preferred embodiments to form waveguide

structures and waveguides(note the plural form) (*see* col. 2, ll. 40 and 44), and the reference also discloses that the method is suitable "in fabricating any type of device which combines optics with electronics in an integrated form" (col. 3, ll. 5-7). As a result, we are persuaded that one of ordinary skill in the art would have reasonably understood the Bazylenko method was suitable for forming a plurality of silicate glass optical cores, as presently claimed.

The obviousness of forming such a plurality of cores is further supported by Dragone's multiplexer which uses a plurality of optical cores. Appellants' arguments notwithstanding, the Examiner properly points out that the claims on appeal do not require a waveguide that has multiple cores and that Appellants' Specification discloses that the present invention is directed to making multiplexers. Hence, the appealed claims broadly encompass making multiplexers of the type disclosed by Dragone.

We are also not persuaded by Appellants' argument that the applied references would not have suggested the refractive indices of the optical cores having a contrast relative to the refractive index of the undercladding layer greater than 2%. Bazylenko specifically teaches that the difference in index of refraction between the optical core and the undercladding layer can be "about 0.02," or, about 2%, which would certainly include and suggest a difference of somewhat greater than 2% (*see* col. 6, ll. 29-33). We perceive no patentable distinction between the claimed "greater than 2%" and the prior art disclosure of about 2% which includes values greater than 2%.

Moreover, we fully concur with the Examiner that Kyoto firmly establishes that it was known in the art to employ the pertinent difference in index of refraction of greater than 2%. To wit, Kyoto discloses that for large aperture optical fibers used in computer link communication applications, a needed difference in index of refraction "is usually about 2 to 4%" (col. 1, ll. 52-54). While Appellants point to Example 1 of Bazylenko which has a difference in index of refraction of 0.8%, it is well settled that a reference must be considered for all that it fairly teaches, and such consideration is not limited to exemplified embodiments. As for the Kyoto disclosure, Appellants maintain that:

> Kyoto merely mentions in passing that "large aperture optical fibers" may have contrasts of about 2 to 4%, without any indication, explanation, or discussion of particular methods by which one may be able to achieve such contrast levels, or the applicability of such teachings to other types of fibers such as waveguides with multiple cores.

(principal Br. 10, second para.). However, Appellants have presented no convincing rationale, let alone objective evidence, which establishes that one of ordinary skill in the art was not able to produce a contrast in the indices of refraction from about 2 to 4%, as specifically disclosed by Kyoto. Also, we note that the independent claims on appeal do not recite any particular method steps for achieving a difference in index of refraction greater than 2%.

Johnson, the other primary reference, also does not specifically disclose forming a plurality of silicate glass optical cores. However, like

Bazylenko, Johnson discloses that the invention is directed to forming optical waveguides and optical multiplexers (*see* col. 1, second para., and col. 2, ll. 54-62). Consequently, we are satisfied that one of ordinary skill in the art would have understood that the high density plasma deposition method taught by Johnson can be used to form a plurality, and not just one, silicate glass optical core over an undercladding. Again, we agree with the Examiner that Dragone further evidences the obviousness of forming such a plurality of optical cores. As for the difference in index of refraction of the core and the undercladding, Appellants acknowledge that "Johnson does disclose that the optical cladding can include any number of materials having a lower index of refraction than the thin film forming the optical component" (principal Br. 14, second para.). As discussed above, Kyoto, as well as, for that matter, Bazylenko, evidences that a difference in index of refraction of greater than 2% was conventional in the art.

Regarding separately argued claim 15, which calls for forming the optical cores by etching a substantially continuous optical core layer, Bazylenko expressly discloses that "[o]ther standard fabrication processes (for example chemical etching) may be utilised with the method of the present invention . . ." (col. 2, ll. 48 *et seq.*). Furthermore, as pointed out by the Examiner, Dragone teaches the use of photolithographic techniques, which include etching, to pattern the waveguides (*see* col. 6, ll. 41-46).

Appellants also separately argue claims 24-27, 31-33, and 39-41 which recite the use of nitrogen as a source gas. We do not subscribe to

Appellants' position that Bazylenko's teaching away from using nitrogen demonstrates the nonobviousness of doing so. Rather, Bazylenko relates a disadvantage in using nitrogen, i.e., waveguides suffer from high losses in the wavelength range of 1.50 to 1.55 μm due to a large absorption peak in this region (*see* para. bridging cols. 1 and 2). Bazylenko establishes that the use of nitrous oxides was well known in the art as an oxidant for silane, and, therefore, we find that it would have been obvious for one of ordinary skill in the art to use a source of nitrogen as an oxidant with the reasonable expectation of experiencing the disadvantage taught by Bazylenko. It is well settled that the omission of a feature disclosed by the prior art along with its attendant advantage is a matter of obviousness for one of ordinary skill in the art. *In re Thompson*, 545 F.2d 1290, 1294, 192 USPQ 275, 277 (CCPA 1976); *In re Kuhle*, 526 F.2d 553, 555, 188 USPQ 7, 9 (CCPA 1975); *In re Marzocchi*, 456 F.2d 790, 793, 173 USPQ 228, 229-30 (CCPA 1972). In the present case, Appellants have not demonstrated that their use of a nitrogen source as an oxidant is not accompanied by the disadvantage set forth by Bazylenko.

Concerning separately argued claims 2-11, 12, 22-28, 29-36, and 37-42, which recite pressure, temperature, and RF power densities within the deposition chamber, we do not accept Appellants' argument that "the deposition conditions taught by Johnson do not amount to or suggest the recited conditions for forming the high-density plasma as required by the

claims" (Br. 15, last para.). While Appellants focus upon the plasma enhanced chemical vapor deposition process described at column 7, lines 13-22 of Johnson, Johnson teaches that a number of chemical vapor deposition processes may be employed, such as Appellants' high density plasma chemical vapor deposition process (*see* col. 4, ll. 25 *et seq.*).

As a final point, we note that Appellants base no argument upon objective evidence of nonobviousness, such as unexpected results, which would serve to rebut the inference of obviousness established by the applied prior art.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

clj

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